



Glenn T. Seaborg Center Seminar

Probing the Structure and Magnetic Properties of Tetravalent Actinide Compounds Containing Selenite, Iodate, or Phosphonate

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Building 70A, Room 3377

The focus of this talk will highlight selected results from my doctoral research at Auburn University, the scope of which is multifaceted. The first topic covers recent research devoted to developing a better understanding of the structural diversity and related physical properties of early actinide compounds containing either selenite, and iodate. These studies are primarily driven by the presence of ^{79}Se ($t_{1/2} = 1.1 \times 10^6$) and ^{129}I ($t_{1/2} = 1.7 \times 10^7$), both long lived β^- emitting isotopes produced through the fission of ^{235}U , in spent nuclear fuels. The redox chemistry of selenium predicts that it will exist as either the selenate (SeO_4^{2-}) or the selenite (SeO_3^{2-}) anion, while iodine is expected to be present as either the iodide anion, I^- , or the iodate oxoanion (IO_3^-). Phosphonates, the subject of my second research focus, have been of special interest with regards to f -element chemistry, primarily as a result of their prospective use in separations. Structural studies of these systems have been limited for transuranium elements due, not only the difficulties faced when working with these radioactive metals, but also to their high insolubility and tendency to form powder or microcrystalline precipitates. This talk will be highlighting the structures of, and magnetic data for, $\text{Np}(\text{IO}_3)_4$, $\text{Np}(\text{IO}_3)_4 \cdot n\text{H}_2\text{O}$, $\text{Pu}(\text{SeO}_3)_2$, and the first well-characterized transuranium phosphonate, $\text{Np}(\text{CH}_3\text{PO}_3)(\text{CH}_3\text{PO}_3\text{H})-(\text{NO}_3)(\text{H}_2\text{O}) \cdot \text{H}_2\text{O}$.